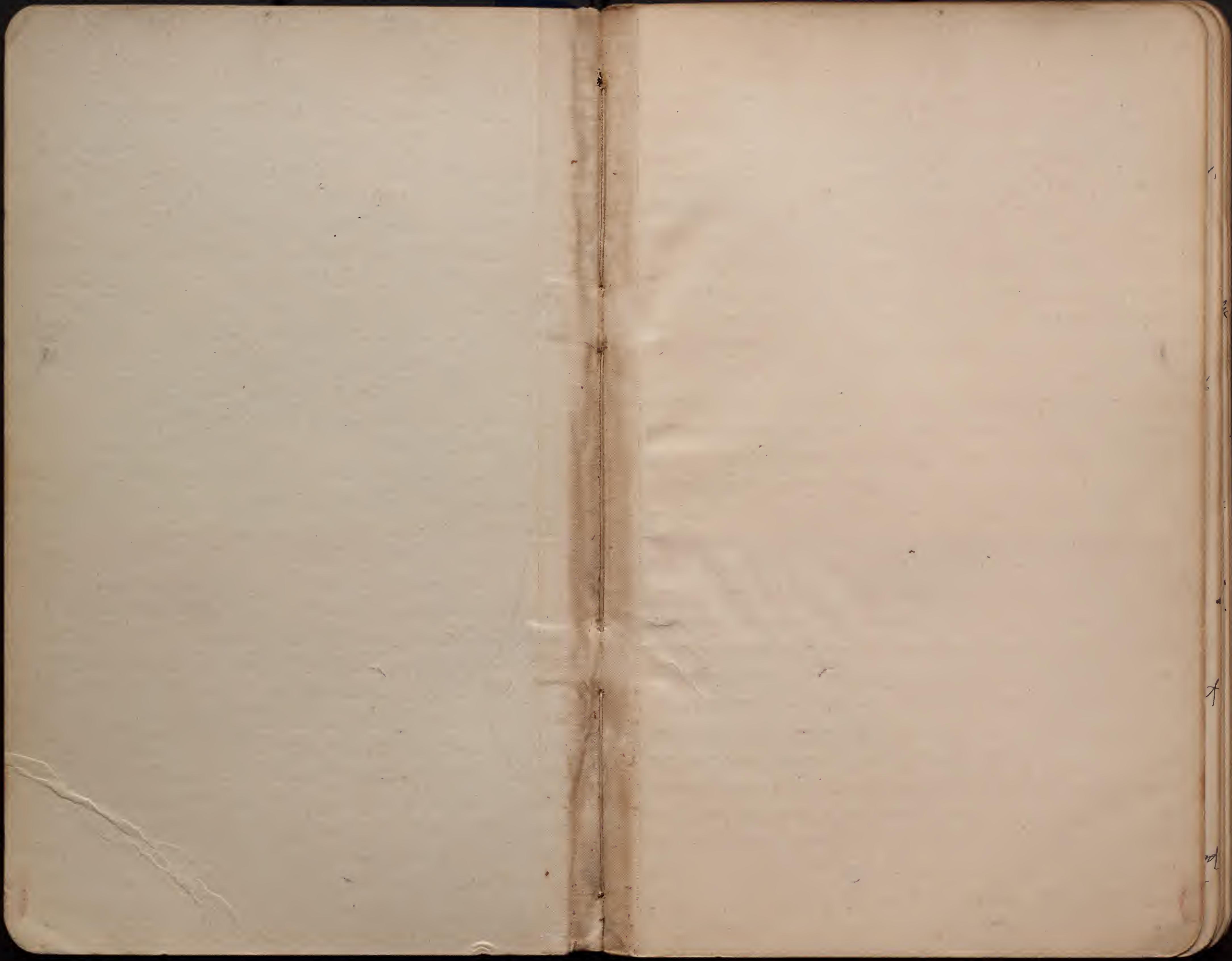


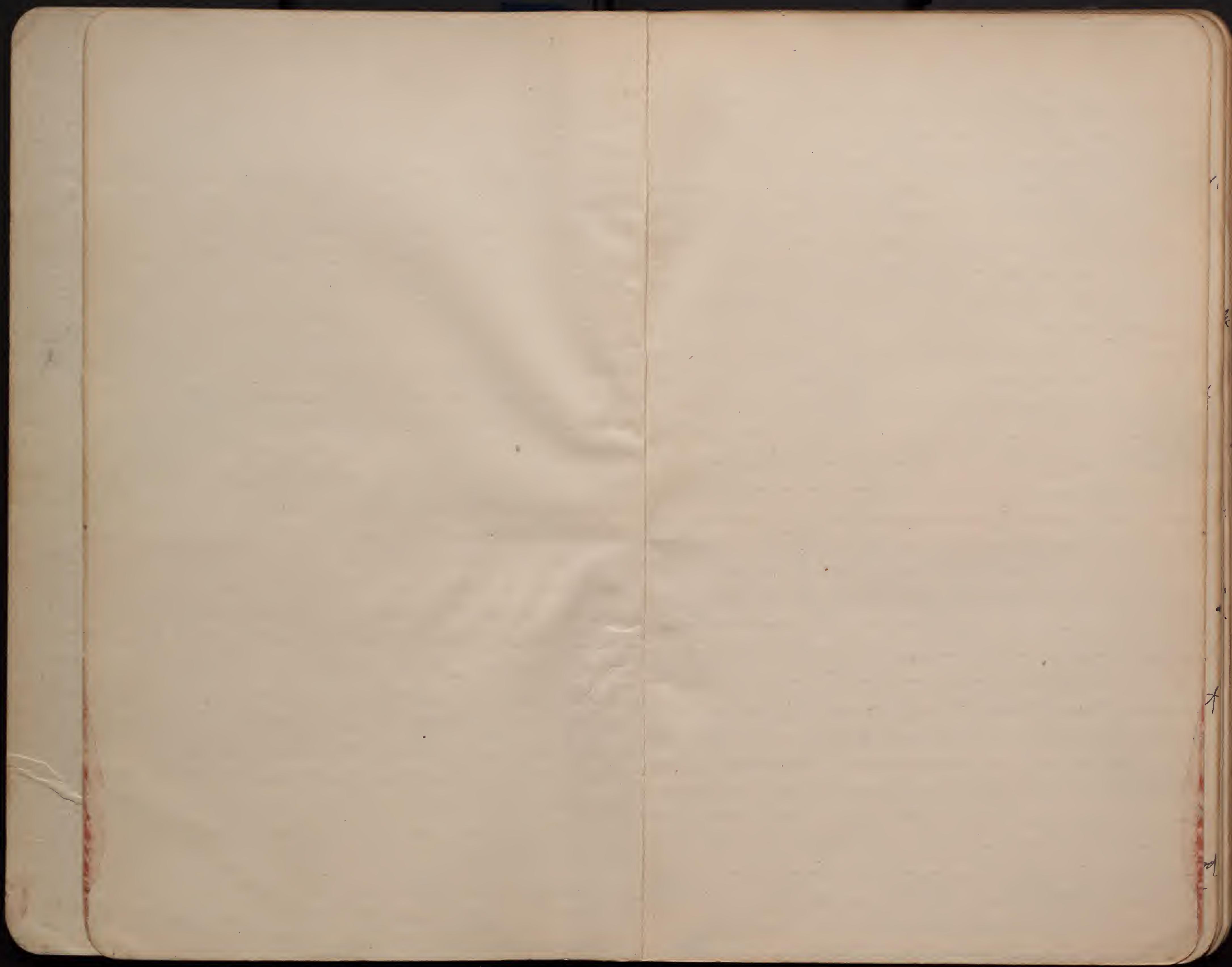
JOURNAL

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Washington. D. C. to Nebraska.

May 4, 1894

Left Washington at 3:45 P.M. by Penn. Lin by way of Baltimore, Harrisburg, Pittsburgh, Columbus, & Chicago for O'Neill, Neb.

May 6 Arrived at O'Neill at 5:20 P.M. Tramped over prairie till dark, but found no gopher hills. Saw some from the train between Ewing & O'Neill. The soil at O'Neill is mainly a coarse black sand, which takes hard in places but is mostly yellow. The absence of gophers is hardly accountable.

May 7, Took the 9:30 A.M. train for Ewing, 25 miles E. of O'Neill & arrived at 10:30. Found that by mistake I had taken the wrong package of traps & had but 2 No. 0 with me. Set all of my traps, caught 2 *Geomys lutescens* & another carried one of my traps down its hole. Dug 27 feet along the burrow but it branched & I didn't get the trap.

Sandhills are all along here. The valley is black sand & good soil.

Yucca glauca is common on the hills. Had a big puff ball cooked for dinner & it was good.

May 8 Caught a *Sitomys*, a *Ruthrodontomys*, & a *Perognathus flavescens*. but no more gophers.

Nebraska

Left Ewing at 10:30 & arrived at Norfolk at Noon. Bought 2 more No. 0 traps & set 3 for Geomys. Caught one bursarius. Found hills along creek bottoms but rove on clay hills back of valley. Set traps for mice on hills.

The land about Norfolk is rich & is mostly improved.

Hotel Oxnard is a pleasant hotel.

Shot a Lepus sylvaticus but did not save it, it was bad.

May 9. Caught 2 more Geomys bursarius, 3 Arvicola austriacus & one Reithrodontomys. Found lots of signs of both the latter.

Moved up to Oakdale & set traps for Geomys & Perodipus. Rained most of P.M.

The sand hills & yuccas begin at Oakdale & extend westward.

May 10. Caught only 2 Geomys but they seem to be true lutescens.

Caught 1 Perodipus. Started westward at 2:15 & reached Valentine at 9:15

Met J. M. Batis on the train.

Went to Ray House. Worked till 3:30 & then got up at 7, took stage to Rosebud Agency & arrived there at 3 P.M. about 30 miles ~~fare \$2.00~~. Packaged geomys skins, set 20 traps, wrote on ledger & idles.

Found Perodipus holes.

Very windy & sandy & disagreeable day. Cold morning, hot day, pleasant evening.

Rosebud Agency + Pine Ridge

May 12 Caught 4 Geomys & a Perodipus
& a Perognathus. All taken for the first
time in Dakota.

Scared a Coyote out of a brush patch
& missed him as he went over the hill.

May 13 Sunday, Found a Perognathus
fasciatus in one trap & a P. flavescens
in another. Left out the traps where
the fasciatus was caught. & brought in
the others. Have to be ready for stage
at 8 in the morning.

May 14 Caught nothing. Picked up the few traps
left out & started for Valentine at 10 A.M.

Arrived at 4 P.M. 30 miles

Altitude at Valentine 2579, Halfway House 2720,
top of ridge between Halfway House & Agency 2775.

Agency 2525, Creek at Agency 2475,
Prairie a mile from creek 2700

A lot of ducks in lake at halfway house.
killed a deer & some longspurs.

At Valentine called on Mr. Bates & got
some plants identified.

Left Valentine at 9:15 & reached Rushville
at 11:15, sent reports & letters.

May 15 Took stage at 7 A.M. for
S. Dak. Pine Ridge & arrived at 11:20

Called on Agent, Capt. Penny

Set traps. Met Mr. C.R. Corning &
Senator C.H. Chyle ~~at~~ at Rosebud &
again here at Pine Ridge.

Rushville to Newcastle.

May 16

Caught 2 Geomys, 3 Perognathus, & 2 Onychomys. Skinned these & took stage at 1:30 for Rushville & arrived at 6 P.M. A gale of wind blew all day & after 3 P.M. it rained & was cold. Saw nothing along road or any time today. Have to wait at Rushville for west train till 1:15.

May 17 Stopped at Chodeon & got 3 hours sleep. Took train to Crawford at 7 A.M. & had to wait 20 hours for train to Newcastle.

Cold, windy & rained most all day. Did not go hunting. Finished reports & did a little work indoors.

May 18. Started for Newcastle at 6 A.M.

About 5 miles north of Crawford we struck clay soil & saw no more Geomys hills, a little farther along a strip of bad lands began & with them sage brush, Atropelix & Sarcobatus. Plenty of gumbo all the rest of way except along Cheyenne River, where is a broad sandy flat scattered over with small cottonwoods that are in rows & look like an orchard. They seem to grow in rows along old water lines. Thowney's hills were easily recognized when first seen just north of Ardmore, but on the sandy flat of the Cheyenne they are not so easily distinguished & may possibly be Geomys hills.

Newcastle

The R.R. follows around the edge of the Black Hills, just cutting through a few points of pines. A few detached series of high, pine covered buttes are seen to the west. The road runs through grassy valleys most of the way. Cactus & sage brush are conspicuous features north of Edmont. Edmont would be a good place to stop & see if Geomys or Thomomys inhabits the sandy bottoms of the Cheyenne R.

Got my nail. Saw Elam Blain, who kept my horses & made arrangements to have the wagon brought in in morning for some repairs. Hunted & set traps up the creek canon and over the mountain side. Killed nothing. Cold & raw. saw but few birds.

May 19 Caught a Thomomys, a Sitomys, an Arvicola austurus & 2 A. rufescens. Made up the skins. Got my wagon wheels fixed loaded up with part of my outfit & went with Elam Blain to his ranch 5 miles S.W. of town. Set out some traps for Putorius nigripes & small things. Blain described P. nigripes & says he saw one last winter & saw their tracks in a large P.D. trail close by.

Found my horses in pretty good shape. Saw one Lepus campestris. A cool day & windy.

Newcastle

May 20 Found a few things in my traps but no *P. maniculatus*. Blaine found a Coyote den & we dug out 3 young ones & kept them alive. Blaine killed a *Lepus campestris*

May 21 Caught some Sitomys, *Perodipus* Cynomys or a Thomomys. Went to town, made up skins, set more traps for Ferret. Very windy.

May 22 Caught a few things, made up skins. Went up the creek to where some gray wolves had been seen lately, but found none. Saw 4 antelope but could not get near enough for a shot. Went over towards Big Beaver Creek. Found a Sage Grouse nest with 6 eggs. While chasing the antelope 2 of the eggs got smashed. Saw two *Lepus campestris*, lots of antelope tracks & one Wolf track. Saw a nest of Swainson's Hawk but no eggs.

May 23 Helped dig out one young Coyote. Caught nothing of account. Went to town. Took 6 Cynomys out of my Ferret traps.

May 24 Killed & made up 2 of our young coyotes & finished up the other things. Packed a box of skins.

May 25 Took up my traps & came to town to meet Loring but he said not to expect him till tomorrow. Got my camp outfit together & went up above town & camped. Wrote on my report all the time I could get. A warm day. John Wier began work at noon.

Newcastle to

May 26, Loring came at 9 AM and we left Newcastle about an hour later. Took the regular road for Custer. Crossed Salt Creek and struck Beaver Creek at the LAK Ranch, then turned into the hills and followed up cañons and through parks and pine woods with a gradual rise until reaching an altitude of 5200 feet, then descended a long gulch and camped at a ranch at 4800 feet. After leaving the LAK ranch we found water only in one pool till we struck the ranch where we camped. Here is only a spring, but plenty of splendid water. Came about 24 miles.

After entering the hills the country lays in smooth ridges & long slopes with rock cliffs along the water washes & cañons. Beautiful grassy parks occupy the more level spaces and a scattering forest of *Pinus p. scopulorum* covers the ridges and steeper slopes. There is almost no underbrush or shrubs. The principal vegetation is grass and pines. *Buxellia*, *Fraxinus viridis*, *Prunus virginiana*, *Ribes aurum*, *R. cereum* grow along some of the ravines. Very few flowers were seen. A little phlox is common, and above 5000 feet a *Dodocathion*. For a long distance there is splendid grass but no water or stock. Deer tracks are common along the road. Saw Tamias & shot one Red squirrel.

A hot day.

to Custer

May 27

Sunday. Broke camp at 10 & went through Custer and camped at the Wilcox ranch where I stayed in 1888. Came 18 miles. Came over one ridge at 5400 feet. Custer is by the average 5250. Passed 2 or 3 good ranches, but no streams of water till near Custer. Struck the granite formations about 5 miles before reaching Custer. Saw one *Arctomys dacota* just after coming into the granite belt. Failed to kill it. Splendid grass, nice country, lots of deer tracks. one Fox track. Warm day.

May 28 Started at 7. Passed over the highest point in our route, about 4 miles north of Custer, at 5900 feet. Then struck the head of Spring creek & followed down to Hill City. Then down to Sheridan & over to another creek & down it 3 miles & camped where the road turns off from creek. Came 23 miles and camped at 4450 feet. Came down gradually most of the way. Struck spruce & species of Birch in the creek ravine on north slope. Spring creek is a good sized creek, clear & cold & rapid, saw suckers & bullheads in it. Saw no *Arctomys*, killed *Sciurus tamias*, & *Spilogale* & a bat. Camped at 5 & ready up skins & pressed some plants.

Rapid City

May 29 Left camp at 7 AM. Crossed a high ridge & then over ridges & through hollows with a gradual descent to Rapid City. At camp the avenoid read 4050 & at 3600 the pine timber ceased except on ridges and rocks. Some pine grows over rocky ridges down to Rapid City at 3000. — avenoid.

Oaks are common & form some groves, some trees becoming one or two feet in diameter & 40 feet high, but they cease with the pines and none were seen below 3600 feet. Our Coon track was seen in road at 4000 feet.

Passed quite a lot of ranches. The country is half timbered & half parks, good grass & not much water after leaving Spring Creek till we struck Rapid Creek. Crossed the wash belt & then down a long slope into valley where at 3250 we struck the first *Populus monilifera*, *Fraxinus viridis*, *Ulmus americana*, *Neemuda aceroides*, *Elephantia argentea*, *Yucca glauca*. Grass is more luxuriant & vegetation farther advanced than up in the hills. *Malvestrum coccineum* is in full flower in the valley but no flowers seen on it all through the hills. *Artemisia frigida* & *hudsoniana* have been with us all through the hills & are still characteristic plant.

Lunched at Rapid. Sent telegram, got some supplies. Crossed over onto Boxelder Creek & followed down it to about 19 miles from Rapid City & camped with splendid grass, water from a farm well, & boards piled up along road. No trees in sight save a few ^{boulders} ~~cottonwoods~~ along creek.

Rapid City to Cheyenne R.

and the black banks of pines covering the Black Hills in the distance. After passing out of the gap at Rapid City the country is grassy prairie with long slopes & high ridges & broad valleys. The soil is hard & dry & in places is mainly gumbo. Tried to set traps at camp but could find no signs of anything but *Thomomys* & *S. Blainvillii*. Saw a few *Cynomys* along road but no other mammals. A ranchman says he saw a few antelope near here not long ago. Saw a flicker in evening but did not get it. Have seen a few every day but could not get near any of them. We each killed a bird from horseback with horse walking & bird flying.

Averiod at camp at 6 PM 2725.

May 30. Caught nothing. Started at 7:30 & struck across rolling prairie to Elk Creek down Elk Creek among numerous ranches & then over the prairie to the Cheyenne R. 4 miles above Smithville & camped by river at old crossing of Rapid & Pierre stage road ^{at Smithville} came about 37 miles Good roads. Prairie all the way, often no trees in sight. Water holes all along but mostly very alkaline water. Small trees along Elk Creek, Cottonwood, boxelder, ash, & willow. Splendid grass all the way. Edge of prairie drops off abruptly into river valley, & shows badland formation. Lots of gumbo in the soil all along. Top of prairie 3200 feet, bottom of river valley 1800 feet. The broken & uneven bank of valley is full of notches & ravines which are full of trees & brush.

Cheyenne R.

The ravines & bank lava flora of this area such as *Juniperus*, *Populus monilifera*, *Elmus americanus*, *Fraxinus viridis*, *Shepherdia argentea*, *Rhus aromatica*, *Artemisia cava*, *Yucca glauca*.

Cottonwoods grow along Cheyenne R. There is no sandy flat on this side near here.

Loring shot a *Lepus campestris* which contained 4 large embryos. She still wore her old winter's hair which was worn off short & crispy.

Fished a *Sitomys* out of an old well by the road. L. shot a *S. 13lineatus* which contained 9 embryos. Shot 2 each of 2 species of longskunks.

May 31 Loring caught 5 *Sitomys*. I caught nothing. Crossed the river and followed down about 2 miles on S. side, & finding a wide sandy flat camped & set traps. Made up birds, hunted, cleaned gun & in evening shot bats. We both got 5 *Vesperomys*. Caught a *Perodipus* & set gopher & *Perognathus* traps. High gumbo hills of bad land appearance, full of gypsum & fossils border the river's valley which in places is one or two miles wide with sandy or gumbo flats & again is narrow. *Populus monilifera* & *Shepherdia argentea* grow in rows along the flats. Thickets of rose bushes are full of flowers. *Symplocosarkus* & *Rhus aromatica* are common on the flats, also *Pentstemon* & *Lathyrus arvensis*, *Opuntia* & *Mamillaria*. Splendid grass, lots of stock.

Mr. Smith who has lived here 15 years says Porcupines are rather common.

To Belle Fourche R.

June 1 Caught a *Perodipus*, a *Perognathus paradoxus* a *P. fasciatus*, an *Onychomys* & 4 *Sitomys*.

Loring got 2 *Hesperomys* & shot a *Colaptes*.

Followed down the river about 3 miles to Smithville P.D. & store at mouth of Elk Creek. Here we climbed up onto the prairie. At river avoided road 1750, on top of prairie 2100 feet at edge.

Crossed rolling prairie about 10 miles & then descended into the Belle Fourche Valley, followed up the river 4 or 5 miles & camped at a ranch which is said to 15 miles from mouth of Belle Fourche, 18 miles from Smithville, 50 miles from Rapid City.

Top of prairie at edge of valley read 2350 & Belle Fourche R. 1900 feet. It is a valley one to 2 or 3 miles wide, with badland sides & gumbo bottom, good grass & along the river groves of Cottonwood.

Junipers & bushes grow over the valley sides as they do along the Cheyenne.

The Belle Fourche flows through a smaller bed than the Cheyenne but carries more than twice as much water. The water is muddy but fairly good to drink. Not half so alkaline as the Cheyenne. There are no sandy flats. Crossed the Belle Fourche on horseback & it came well up on Juniper's sides. Set traps, did not finish making up specimens. Came 2 miles today.

Grats are plentiful, & in evening some mosquitos bother. Can just see the Black Hills & Bear Butte.

Left the Belle Fourche

June 2

We each killed a flicker & I caught a *Rhithrodontomys*. Loring got 2 Sitomys. Made up 9 mammals & started at 8 A.M. Followed up river half a mile & turned up a gulch and climbed to top of prairie. Aneroid read at river 1800 & on edge of prairie 2300. Passed one ranch with good spring 10 miles from starting place & no more ranches & only stagnant water all day. Camped at sundown on prairie with good grass but only stagnant water from a cattle walker & cow chips for wood. Barometer 2500 at camp. Probably came 25 miles, or more, good road on prairie. Headed straight for Bear Butte wherever surface would allow. Have been in sight of the Black Hills all day & at night they appear only 15 miles to the first pines. Followed edge of Belle Fourche Valley & could look down to river most of the time. The valley spreads out & becomes wider & shallower as we go up it. Can see a few cottonwoods along the bottom. Junipers & brush grow along the sides lower down but vanish as the valley widens. The prairie is smooth & grassy. Skunk's grazing but too dry to crop. Could see ranches in valley on both sides of us. Prairie birds are abundant but little signs of mammals seen. A few *Cynomys* seen & holes of *Thomomys* & *Spilogale* & Badgers.

Set out a lot of traps at camp but it was too dark to do more than put them in paths. Shot Plover & Curlew for food. Found nests of *Schoenicurus*, *Calamospiza* & *Otocoris*.

Alkalie Creek

June 3 Sunday. Got only one setomys in the traps. Loring got an Otocoris nest. Broke camp and traveled about 10 miles & camped on Alkalie Creek 13 miles east of Sturgis. Camped in the shade of a little elm tree & took a rest, the first rest since leaving Newcastle. Came over the same kind of prairie as yesterday till we struck down into the creek valley. The Belle Fourche is off 15 miles to the N.E. The valley that we followed in sight of yesterday afternoon was the Alkalie, a branch of the Belle. Barometer at morning camp read 2500, at Alkalie 2400 at 1 P.M.

June 4. Got up at 4:30 and started at 7.

Loring caught a Thomomys, I shot a *Lynx canadensis*. We got 6 Coleoptes of various forms of intermediacy. I shot a pair at nest but the young had no feathers & were not fit to save. Shot a *Tamias* at Ft. Meade. Took full notes on plants along route. Ft. Meade is in a pretty valley at foot of hills, is a large post. Bear Butte rises a few miles to the east & looks like a volcanic cone but probably is not. Should think it was 1000 feet high from base. Bear Butte Creek is a fine stream flowing through the post & through Sturgis, is clear & pure. Pines begin on the hills at post. Oaks are common & *Populus angustifolia* begins & extends up to Deadwood. After passing through Sturgis we turned into end of canon, passed through toll gate & followed up the canon of Bear Butte Creek

Deadwood + Spearfish

for several miles. Stopped for lunch in canon about 5 miles from Sturgis when *Micropterus melanotus* were flying about high cliff where they evidently had nests. Very difficult place to get at but not impossible. Saw others flying about cliff at Deadwood.

Reached Deadwood at 4 P.M. Got some supplies + tramped out about 5 miles on the Spearfish road. Camped on little stream at edge of open valley country at a level considerably below Deadwood. Washed up skins. Set no traps.

Had a good road and no bad hills to Deadwood but on leaving there had a steady climb of 450 feet to crest of divide. Then down grade. Passed through 3 toll gates. A very hot day.

June 5 Started at 8 A.M. Traveled most of the day through grassy valleys with ranches all along. Our camp was at the northern foot of the hills and the road follows around the base. Before reaching Spearfish we could look far out to the N. + W. over low country at Spearfish at the north end of the Bear Lodge Mts. begins + the rest of the way they shut off the view to westward + enclose a valley between them + the Black Hills. We are on red soil all day with splendid grass, lots of dust + much gypsum marble. Came about 30 miles + camped on a little creek between the Bear Lodge Mts. + Black Hills, about 15 miles N.E. of Sundance.

Sundance

Oaks, pines & other trees come down to Spearfish which is the prettiest is located town in the Hills. It is at the mouth of a fine canon & at edge of timber. There is a fine stream of water as clear as crystal. The town itself is rather nice, there are many good cottages with trees & shrubbery. The valley below town is full of good irrigated farms. The view from all sides is pleasing. Butch is only a little died out town but is on a splendid stream & in a good farming valley. Caught a horn toad but it escaped. Killed a Calaphis Caper, saw several more flickers.

June 6, Caught an *Arvicola austernus* & a *Sitomys* & Loring caught 6 *Sitomys*. Started at 8 & reached Sundance at 11. Got mail & found Dutcher & camped a mile west of town. Made up a few specimens & wrote on reports. Sundance is in a corner between Bear Lodge Mts. & Sundance Hill. Traveled over red soiled valley with gypsum & marble. Splendid grass.

Sundance

June 7,

Wrote reports all day. Shot a *Tamias* of the Black Hills form & a *Coloptis*. Loring wrote on his report but has not finished it yet. Dutcher set out a line of traps. The first little slower since we started.

June 8. Dutcher & I went up to top of Warren Peak which is the highest peak in the Bear Lodge Mts.

Followed a wood road nearly to top. Wagons could be taken to the peak. People have been hauling dry pitch pine from near the summits. We rode to near the peak. There is a good timberline on the Mts. *Pinus ponderosa* is the only conifer & does not reach to the peak. For several miles along the crest of the range and about the upper 500 feet is base of timber, grassy & smooth. No cliffs.

On N. E. side of peak the pines & poplars come up the highest of any place. A tongue of small trees reaches to within 100 feet of the top.

Large banks of snow lay in gulches away below the summit. Little streams start in the gulches on all sides of the peaks & run off through beautiful parks and meadows. The whole view from the peak is beautiful. The Black Hills on one side, the Devil's Tower about 15 miles away on the other & beyond it badlands. Apparently no one lives in the mountains. Saw no signs of big game save deer tracks.

Shot a young *Lepus baileyi* & 2 ruffed grouse & some *Tamias* & got a pumas nest & found signs of *Arvicola* about timber. A downy oak grows about timber.

Sundance

Note, June 11, we went up in the Bear Lodge Mts. from west side and found the oaks ranging from base to near summit continuously and they gradually dwarf towards the summit.

I saved specimen but could get no acorns. The fire had killed it all about 2 years ago & burned up all the acorns & the young sprouts are not yet old enough to bear. It grows in great thickets & only above the pines, ranges from 2 to 6 feet high. Oaks at base of Mts. are common but do not reach far up into the pines. The pine belt separates the two sides for about 1000 feet.

Set traps in gulch above camp. Packed specimens.

At Sundance the aeroed road 4550 at 7 AM. On top of Warren Peak 6400 at 12 + on return to camp at Sundance at 5 PM 4675. Collected several species of boreal plants on peak.

June 9 Rained hard all night, the creek up, gumbo like grease, traps all knocked out, grub wet & a nasty morning generally. Could not move camp on account of gumbo so made up skins & set new traps in gulch. Loring packed up to leave us on the morning stage. Cleared up in P.M.

June 10, Sunday, Loring left on the stage at 5 AM. Dutcher & I packed up and came around to south side of the Bear Lodge Mts. and camped at the base, and did nothing the rest of day.

June 11, Found we could get up Warren Peak by following an old road around farther to west side of Mts. Came about 5 miles and camped at west base of the peak, took traps & went up & set them above timberline but found only poor signs of Avicolas. They have covered the higher part of Mts. under the snow but now have gone back along streams.

To Devil's Tower

The high up holes are all abandoned.
Caught one big *Oreamnos* *lakota*. Came back and
set traps along creek at camp. Saw a few
deer tracks. The oaks go clear up on this
side of mountain & become dwarfed above the pines.

June 12 Went up mountain to traps before
breakfast. I caught a *Zapus* & *Thomomys* high up
on Mountain & 2 *Zapus* near camp. Dutcher
caught an *Arvicola riparius* high up and 3 *Thomomys*
and at camp he caught 3 *Zapus*, & another *Arvicola*
riparius. Packed up & started at 8 A.M. Averoid
at camp was 5500, climbed up to 5700 and then
began to descend through parks and groves of
pines & oaks & poplars, some beautiful meadow parks
very little water seen, two small streams crossed
at base of Mts. Came down several very long,
steep hills, road not much used, no ravelles
till we struck the Belle Fourche. Pines and oaks in
stripes and patches clear to river. Deep canons
run down from base of Mts, with flat topped
ridges between. Base of Mts. at 4000 feet & from
that a slight descent to edge of river valley, down
which we descended 100 or 200 feet to river.

Reached the Belle Fourche at 1 P.M. and followed up
the river about a mile and camped on west side.
The river flows directly north, is very wide &
very deep to the banks. The water is like dirty
milk and higher than usual owing to the rain.

Much of the bottom of valley is sandy.
Cliffs of yellow sandstone & of red shale
border the valley. The river bed is hard &
covered with stones. Stony flats are common

June 12, Came through a patch of pines about a mile where fire had killed them all several years ago & they had become rotten & had all broken off from 10 to 30 feet from ground, leaving a thick post of dead pine stubs. All were rotten. There was no regularity of directions in which tops lay.

Devils Tower

and numerous pieces of small stalactites & fossils & lava pebbles are mixed with other stones. The river flat is a mile wide. There are some ranches with small fields & large pastures.

Pines come down to river, oaks grow in patches. Cottonwoods (*P. Nordica*) are the commonest trees along river flat. Diamond willows are abundant & well diamonded. *Shepherdia argentea* is abundant. *Fraxinus americana* - white ash, in canon, so is *Nigundo aceroides*. A little blue Lupine and a Daha like annual which we found at foot of Cheyenne are common here. *Plantago patagonica* is abundant over mesas, growing in solid patches.

Set out a lot of traps. Shot Scirurus & a cottontail.

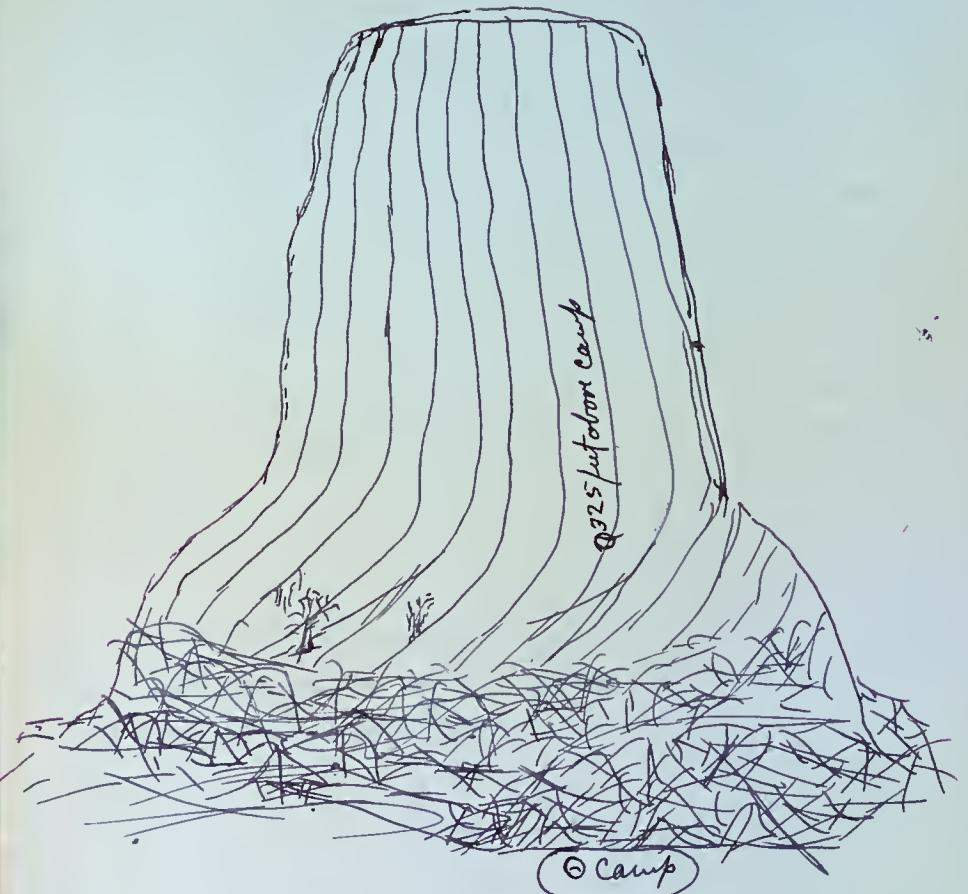
June 13 Rained hard in night, caught nothing. Dutcher caught a Zapus & a Sitomys.

Started at 9:30 and followed up the river about 6 miles to the Devil's Tower. The road is rather slippery but not very bad. is mostly sandy instead of gumbo. Followed a picnic road up a gulch around back of tower and camped close to base of tower on west side at the picnic grounds. It is a lovely place in pinewood with green grassy parks, clean & shady. A pool of rainwater near by furnishes us a supply but it is 40 rods down a steep hill to the little creek. Grass is splendid. Strawberries are ripe.

The tower stands on a bluff close to the west bank of Belle Fourche R. Its long diameter is N. & S. At river at foot of bluff the Acreoel read 3525 & at camp at base of tower 3935.

Devils Tower

I took a record up on base of tower to upper part at base of columns where it read 4250. The talus of broken columns lies at an angle of 30° for 200 feet at base. It is in immense blocks, some of them 8 to 10 feet in diameter and 20 or 30 feet long as tree and straight as the oblique. Some are 4 some 5 & some 6 sided & Wies said he saw one 3 sided. The rock looks like granite but is not. It has a gray body full of white crystals, much like that at foot of Shoshone Falls, Idaho. Is hard to break. From the west face the tower is symmetrical with the wide side facing. It tapers upward by narrowing of columns. At the base ~~the~~ the columns bend around and out so as to form an enlarged pedestal but when they turn upwards they become symmetrical & appear to have straight, true edges. There are about 50 columns on west side and 16 at the end. Pines & junipers grow at upper edge of talus and on base of columns up as high as I climbed. A flag pole stands on top of tower at west edge placed there last Fourth of July by a Mr. Rogers of Sundance. The staff appears about 50 feet high. He climbed the tower by driving wooden pins in a fissure up north end & railing a sail to them so as to make a ladder. The top of tower is slightly rounded and on the edge grow some green plants. The top probably contains $\frac{1}{4}$ of an acre. The columns look small but are 8 to 10 feet in diameter & when close by are so immense that you can hardly imagine them of crystalline formation. Found ice deep among broken talus. Set traps.



West face of Devil's Tower.

Devil's Tower to Little Mo.

The surrounding rock formation at base of tower is yellow sandstone & below this red sandstone. On the west a big ridge connects the tower with the base of the Missouri Buttes, which appear to be ~~5 or 6 miles to the west~~ distant. They are about as high as the tower and apparently of the same sort of rock but not in basaltic columns. They rise like rounded domes.

June 14 Caught 2 Neotomas - a Spermophile, shot a Scirurus & Tamias. Dutcher shot 2 Tamias & a Gopher. Made up skins. Moved camp down to river & set traps. Wrote Bear Lodge Mtn. Report. Saw one bat but did not get it. Got out 60 traps.

June 15 A splendid night for mice but did not catch a thing in traps except a ~~Thomomys~~. Went down the Belle Fourche about 5 miles to Bear Gulch & then up that and over the divide and down to R. Little Missouri and camped. Came about 20 miles but not by the most direct road. Camped in sight of and about 10 miles from the Missouri Buttes which we passed on the way. Pine & oak timber follows the gulches & crests of ridges across the divide & down nearly to the Little Mo. Farther north a big timbered ridge seems to astride the river. There is timber in sight in the distance ~~on~~ on high ridges to the N.W. & S.W. of us. Apparently a big ridge runs west from the Buttes and probably carries with it pine timber. The top of the divide crossed is great parks

Little Missouri to Little Powder R.

with pine timber in strips, a beautiful place with splendid grass. not much stock & only one poor ranch seen. The divide registered 4000 feet. The Bell Forks River 3300, and the Little Mo. R. 3400. On the divide we met for the first time since leaving Newcastle *Asternisia bidentata* & when within 50 feet of the bottom of Little Mo. R. we struck *Sarcobatus* for the first time.

At the river I found some *Rumex venosus* which is the first seen since leaving the bottom of Cheyenne Valley at Smithville. I had considered it good Gavran & still think it is.

The Little Mo. is a small creek almost dry in places but with lots of deep pools that have been dammed by beaver. Trees have been cut all ~~out~~ along the creek by beaver but more fresh than nearly a year ago. Began to rain soon after camping & all is gumbo.

We took out 86 traps.

June 16, Did not rain much at camp but rained hard southeast of us. At daylight the river had risen about 3 feet & before we left camp it had risen 2 feet more & was a rushing torrent of stinking mud & filth. The horses were on the other side & Dotcher had a line of traps also on the east side. He had stepped over a tiny stream to set them but had to swim across to get his traps & the horses & the horses had to swim back. He lost 5 trap set along the bank of the stream & I lost 2. We caught only 1 *Thomomys* & a lot of *Sitomys*. Broke camp about 8 & struck west over the ridges on an old dim road.

Little Powder River

struck another creek, mostly dry, a branch of the Little Mo. Saw 2 fresh wolf tracks in road & soon after saw 5 Antelope & were Cots, in all 14. We got one good shot but made a mess of it & did not get any. Passed the D Ranch at 11:30, 6 miles from Little Mo. they say, & from there had no road. Followed up a creek to divide & down other ^{dry} creeks & ridges till after 6 & camped by a pool of rainwater in a wash not far from a wide valley which we suppose to be the Little Powder R. Valley.

Before crossing the divide we had gentle slopes & mostly smooth ground with not many hard pulls but on this slope it has been broken & rough with deep washes & badlands. For awhile we were out of sight of pines but soon saw them again on the divide and thence stretching along the broken ridges to the North and south of us. A few cottonwoods grow along the wash but we have apparently left the oaks at Little Mo.

Passed a couple of small Prairie dog towns above the D Ranch. A Blacktail deer came down to drink near camp as it grew dark but we failed to get any venison.

Came about 20 miles I guess.

The soil is sandy in places and then gumbos. Coal shows in narrow strata along the gullels near camp. Splendid grass all the way and not much stock. A good many dead cattle seen.

Caught a horned toad near the D Ranch & saw another farther up creek. These are the only ones seen except those between Spearfish & Sundance.

Little Powder River

June 17 Got up at daylight & hunted for my deer but couldn't find it. Made up a few skins & started at 9 o'clock. Crossed Duck Creek, which is the creek we followed down & camped on, and climbed a long slope to the west & followed the ridges for about 8 miles before coming to the Little Powder River. Were fortunate in finding a fairly smooth route while on both sides were rough badlands. Struck Little Powder R. just below mouth of Elk Creek and camped by river on east side. Found a dim road on other side of river & a couple of roundup men came along & told us where to go.

Saw a big PD town on top of ridge & at one of the holes all of the dirt thrown - about 2 bushels - was coal. Other woods showed black. Saw an antelope but it was wild. Shot a *Lepus campestris* for supper.

Camped under cottonwoods at river & set traps. Found plenty of old *Perodipus* holes but no fresh ones. Found the two Sonoran plants in abundance, *Psoaraha tenuiflora* & *Lycium pessulus*.

The river valley is sandy, about half a mile wide & half covered with *Populus monilifera*.

The river is 2 feet deep & 4 rods wide, a torrent of yellow, stinking mud with dead cattle all along the shore. The cowboys said that yesterday it was almost dry.

Thunder storms all around in PM as every day for weeks past.

Little Powder R.

June 18 Crossed to west side of river and followed up it about 6 miles to mouth of Whitetail Creek & then followed up that past the WM Ranch and over the divide and down Bitter Creek to the first water hole on it & camped. Came about 20 miles. Found Perodipus abundant along Little Powder Valley and about 2 miles up Whitetail Creek & then saw no more signs of them or of Sonoran species. The country is all a burned out coal field & the scoria looks like lava. Rough hills & steep ridges are covered with scrubby Pines all across the divide.

Caught Perodipus, Onychomys & Sitomys at Little Powder. Set out traps for *P. nigripes* in prairie dog town tonight.

The water at Bitter Creek is the worst we have found. A small spring comes out of bank & is strongly charged with gypsum & tastes of the coal which crops out in numerous seams.

Saw the Bighorns dimly from the divide, probably 75 or 80 miles straight.

June 19 Caught nothing.

Followed down Bitter Creek to mouth of Powder R. At SA Ranch which they say is in Montana. Proceeded up the river on east side about 2 miles & camped near river. The country is the same burned out & worn down scoria field, very rough & steep & broken. Steep cliffs of red & yellow sandstone border the valley. The country is mainly badlands covered with stunted *Pinus ponderosa*

The aeronaut read at Little Powder River 3350, on divide 4050, and at Powder River 3340. Intermediate readings are given in note book.

Powder River

Camped at river at 3 P.M. & wrote on report & made up a few specimens. Got one *Tamias* on the way. It looked so much like raining we did not set any traps. Began to rain hard in evening & flooded our tent & settled down for a nasty night.

June 20 Rained hard all night, we were on low ground & were flooded. Built a dam around inside of tent & bailed it out with wash dish. Dulcinea & I went out in this slickers & shovelled ditches till we could get dry ground to sleep on.

Got up late & after breakfast did some writing till noon while we waited for the water to run off. Broke camp at noon & followed up river about 10 miles & camped about 5 miles north of the mouth of Clear Creek. The roads are very bad & the river is so high we can't cross for probably 2 days at least.

Set traps, but found little signs of mammals. The valley bottom is a mile or two wide, High badland bluffs covered with scrub pines & junipers border the valley. Sage brush, of the 2 standard species - *Tridentata* & *Cava*, are the predominant shrubs. *Sarcobatus* is common & *Atriplex confertifolia* was seen on gumbo slopes. Some *Atriplex micrantha* was seen. *Psoralea tenuiflora* & *Lupinus pusillus* are common & also a pretty white flowered *Abronia*.

Coal is abundant & also scoria when coal fields have burned.

Powder River

June 21 Caught nothing. Dutcher caught one
Motona. Shot 2 Tawias & some birds.

Hunted part of forenoon. In PM went up the
river about 5 miles to mouth of Clear Creek &
camped. The river has gone down over two feet
today & is falling rapidly. Can cross in the
morning without trouble.

Set each of us a line of traps through P.D. traps
for Putoribis rigipes but with no prospect of
success. A hot day. The road is mostly
dry.

June 22, Caught nothing in our traps.

Crossed Powder River & followed up Clear Creek
crossing it 11 times. Water came over the bottom
of buckboard in every crossing & wet some
things in the load, wet the specimens in one chest.
Reached Clearmont at 6 & camped near town.
Came 25 miles. Just got up the tent in time
for a hail & rain storm. Could set not traps
save a few for Thomomys. A hot day.

The Bighorns are in full view nearly all
the way & now loom up grandly with
snow all above timber.

June 23 The horses got behind a hill & we
did not get them till noon, but it did not
matter much as it rained nearly all night
& the road was bad. Caught only a Thomomys.
Started at 12 & followed the railroad till
6:30 & camped near Arro. Guess we
came about 15 miles.

To Sheridan

Followed up an easy grade and over a divide & down another creek among big, grassy hills with scoria rock caps.

The country is very rough with high, steep hills, but covered with soil & vegetation.

Grass is big & thick. *Artemesia cana* is the commonest shrub. Willows & boxelder grow along the creeks. A few pines grow on the highest hills. Springs are numerous near the divide & in gulches. Part of the soil is sandy & part gumbo. Saw some *Cynomys ludovicianus* some wolf & coyote tracks & shot at a black-tail deer. Killed a young CAlgates.

Rained a few showers & then cleared up.

Tried to get horse feed at Clemon's but at the stores they had no grain, no meal, no flour, no ~~oatmeal~~, nor potato or sugar.

Cyecades are numerous & have been all the trip. They buzz like a rattle snake & scare us all the time. Never saw them so numerous.

June 24, Sunday morning & still 22 miles from Sheridan. Did not hurry & got started at 9 AM. Followed down the creek and over a ridge to another stream which I suppose to be Prairie dog Cr. then over to Sheridan. Arrived at camp at 9:37 AM & at Sheridan at 5 PM, 3500. Soon left the big hills & the creek valley broadened. Ranches are scattered along. Good farms & fields of irrigated crops along ~~the~~ Prairie dog Creek & Goose Creek and beautiful, rolling, grassy upland. Sheridan is about the size of Lander & is in a prettier country, is close to the base of the Big Horns.

Sheridan

June 25. Staid in camp all day writing reports and packing specimens.

June 26. Mailed 6 packages & sent one by express. Sent reports, letters & telegram.

Followed up Big Goose Creek to the canyon where it comes out of mts. Could get up as far as & camped, though the grass is mostly eaten off by cattle. Came about 18 miles. Avoided road of Sheridan 3500 & at camp 4500. Correcting from base our actual altitude is 4700 feet.

Pinus ponderosa & *Psudotsuga douglasii* & *Acir* & *Betula* are common at our camp & scatter down 300 feet lower.

Populus angustifolia has completely supplaned *monilifera* & all along Big Goose Creek forms a forest strip of unusually large trees - it reaches up to our camp.

Big Goose Creek is too large & deep & swift to ford. is a splendid stream of clear water & irrigates a great area. Good farms are scattered all along it. A good deal of Alfalfa is raised & does well.

Large ditches swing off over the mesa & small ones are taken out of the river at frequent intervals. Beside the creek valley the country is grassy mesas with some sage brush. *A. tridentata* begins again for the first time since we left Powder R. Rained last night & again in PM.

Bighorn Mts

June 25, Caught only Sitomys.

Went up the mountains for an all day's tramp. Camp is 4700 feet. Went up the Mts to 7400 feet. Killed Tamias, Spermophilus & a Dendrogopus. Dutcher killed 5 Dendrogopus, & a Spermophilus.

Saw deer, elk & sheep tracks.

Found *Pinus ponderosa* & *flexilis* & *unisperma* & *Pseudotsuga douglasii* & *Picea engelmanni*.

Had a steep and difficult climb & did not get near any of the snowy peaks. On top of the table land, or forest plateau at about 7000 to 8000 feet a heavy forest stretches away to the peaks, much as in some places at the south end of the range. Rained by spells all day.

got back to camp at 7:30 hungry & tired.

June 28. Made up skins & did not start till 11.

Followed down Big Goose Creek 5 miles & then struck north over ~~over~~ ridges & creeks to Dayton on Tongue River & about 2 miles beyond & camped at 6:30. Followed parallel & not far from the base of Bighorn Mts. Meas, rolling country, & valleys. Good grass & in valleys farms with fields of grain & alfalfa. Alfalfa is in full bloom & is being cut for hay.

Tongue River is a rapid stream, too big to ford. Splendid clear water. Is full of ties for R.R.

Trees & brush grow along the river & a wide valley is watered by it & the farms look good. Set traps for Arvicola & Reithrodontomys & Thomomys all of which seem to be common. Heard S. 13 Linnet & saw young Cypomys & killed a Tamias.

Pass

June 29 Caught only a Thomomys & Arvicola austrius. Was disappointed at not getting any Reithrodontomys. Moved camp about 6 miles to where the road strikes the R.R. & spent the rest of the day writing & setting traps. The country is all fenced & is either in pastures or fields. Camped in a wean place but the prospect for Reithrodontomys is good.

June 30 Caught only one Thomomys & Dutches caught a Thomomys & one Arvicola austrius. I still believe that Reithrodontomys made the runways that I found but it seems impossible to catch one. Had to hunt horses & did not get started till 10. Crossed a low ridge & struck the head of the Little Big Horn R. near the Montana Line & passed through the little camp town of Pass close to the Montana line & camped 2 miles beyond on the Crow Reservation in Montana. Set out a lot of traps. Killed a cottontail & 2 Sharptailed grouse. Found an Indian baby buried in a tree in a soap box. A grassy valley w-smoothly rounded hills & ridges covered with splendid grass. Only a little creek with a few scattering boulders along it.

July 1 Caught 2 Arvicola & a Zapus & Dutches caught 5 Arvicola. Left out our traps & staid here all day - Sunday. Found some very good fossil wood on top of a hill close to camp.

Little Bighorn Valley

July 2 Took up traps but got nothing of any account save a couple of immature cottontails. Mammals seem wonderfully scarce. From about 80 traps we got only 5 mammals. Horned larks seem to be the only species at all common. Even Prairie dogs are scarce, though old abandoned holes are common.

Started at 7 & traveled at a good rate till 5 down the river valley & camped on grassy flat close to river. Set out 93 traps (both of us) mostly in brushy & weedy places for *Ruthrodontomys* & in old field for *Perognathus*.

We are now opposite the north end of the Bighorn Mts. On the east is the range of high hills with ~~with~~ rough tops covered in spots by pines called on the map Rosebud Mts. They are back 5 or 6 miles from the river & between is a ~~ridge~~ mesa of good grass land while on the west side of valley rolling, grassy mesas extend to the Bighorns, cut through at intervals by creek valleys.

The river flat is from one to 2 or 3 miles wide. about half of it is splendid grass land & the other half covered with groves of Cottonwood, ash, boxelder, & willow, & thickets of bullberry, chokeberry, plum, rose, strawberry & tall weeds. Big ditches have been taken out at several places & the whole valley might easily be irrigated, but only a few little patches are watered. Indian cabins are scattered all along through the brush but not one seemed to be occupied & we did not see a molekin all day.

Crow Reservation

The slovenly one & two wire fences are half down & the goodless horses are pasturing in the Indian meadows. At west of the cabins a small patch of ground has been plowed at some time but is now grown up to mustard, cockle, wild buckwheat, wild sunflowers & some other exhotic weeds. Evidently these patches have been plowed & sowed to grain for the Indians, but have not been cultivated after & the foul seed continues in the soil.

The valley is full of mosquitos which give us no peace until late in the evening when it gets too cold for them. Probably the mosquitos have driven the Indians out of the valley for the summer, else they have fled before the R.R. or else have gone to the big fight & dances at the agency.

R.R. grading camps were passed at intervals of 2 to 4 miles all day. The end of the laid track was passed in the morning a mile from our camp. The valley offers an easy & good route for a R.R. & a good road is being built. The soil of the valley is a mixture of gumbo & sand & seems very productive. Every bit of the valley could be watered.

Travelled about 25 miles.

July 3 Out of 93 traps we got only 2 Sitomys & 2 Arvicola. Followed down valley, which does not change much in character to the Agency. & Camped about a mile from agency

Crow Agency

+ a mile from the Nat. Cemetery where Custer & men are buried. Found an Indian encampment on the old battle field preparing to celebrate the 4th of July by a sham fight & big dance. We counted 312 regular tepees & there are at least 100 tents & round top wickups besides. Should think there well 1000 Indians present bucks, squaws & kids, all dressed in all their finery with bright clothes & loaded with ornaments.

Set traps

July 4 Caught nothing in my traps & Dutcher got only 2 Setomys.

Called on the Indian agent - Mr. Watson.

Went up to the Custer Cemetery & watched the Indian dance & sham battle. There are said to be about 3000 Crows present & 900 ~~Sioux~~ & a lot of Sioux, in all over 4000 Indians.

Returned to camp in time to set more traps, but it soon began to rain hard & there seems no prospect of catching anything here.

July 5

Caught only a Setomys & an Arvicola. Rained hard all of last evening. Went down to Agency & then on to Ft. Laramie. A lot of railroad trains were crossing & we could not get over tonight so camped on point between the Little & Big Horn Rivers & set traps on east side of both. Rained again about sundown.

Ft. Custer

Between the Agency & Fort the road runs across a beautiful broad mesa which forms a triangle between the rivers. It lies admirably for irrigation & is splendid soil. The whole valley of the Little Bighorn is well adapted to farming by irrigation & if not on a reservation would be thickly settled.

Roads muddy & bad. No signs of mammals except Hornedys till the forks were reached - then are plenty of holes of *Perodipus* & *Perognathus*.

Began raining at Silverhorn.

Soreobatus is common at fork of rivers.

July 6 Dutcher caught a *Perodipus* and *Sitomys* & I got some *Sitomys*. The rain spoiled all chance of success. Made up some skins & went to Hi Fort for telegram but got none. Had to wait till nearly noon to get across the ferry & then ford nearly half the river.

Followed about 2 miles up river on west side & camped at edge of bottom land. Set traps in brush but there is little sign to indicate mammals other than *Arvicola* & *Sitomys*.

The Bighorn River is high & a muddy torrent full of trash & drift. Islands & bottomlands are covered with Cottonwoods & willows & Bullberry bushes & rose & amelanchiers. A wide wide, flat valley with gumbo soil extends back on west side 2 miles & is covered with sage & *Helianthus annuus* & *Sarcobatus* & grass. Feed is good. Mosquitos bad.

Ft. Custer & Pryor Creek

July 7. Caught only Sitomys.

Moved camp up river about 8 miles and camped again on bank of river. Set traps in brush and on flats. Passed through a large *Cyrtomys labovicinus* town & saw lots of *Perodipus* holes. Mosquitos are fearful. A hot day. A good many cactus & sonoran plants.

July 8 Sunday. We got 2 species of Sitomys, some *Lepus sylvaticus* & *Thomomys* in traps. To escape the mosquitoes we pulled up & came back down the river to the Billings road & camped at water holes about 10 miles west of Ft. Custer.

A hot day. Came about 12 miles

July 9 Started at 8 and crossed over a low divide and down a small dry creek to Spring Creek & up it to head and then over a higher, flat topped divide that resembles the Llano Estacado & then down Indian Creek to Pryor Creek. Followed up Pryor about a mile, crossed to west side & camped a mile farther up.

Along upper part of Spring Creek the valley is good with splendid grass, a nice stream, pools & trees. Pryor Valley is narrow & the bottoms mostly brushy & trees - *Populus monilifera*, boxeldy, willows, bullberry & brush. Abrupt hills with flat, greasy, tops border the valley & extend back as prairie. *Pinus ponderosa* & a few junipers grow along the edges of valley low down on Pryor Creek & on buttes off toward the Yellowstone.

Pryor Creek is a small stream, crooked, in steep banks, muddy & nasty.

Pryor Creek

July 10 Mosquitos were fearful. Could hardly sleep. Followed up Pryor Creek Valley all day & camped about 3 miles above (south of) the Mission & Sub-Agency. Still about 4 miles to Pryor Gap.

The valley opens out as we come up it. The hills along the sides become lower & carry no pines & no brush except in gulches. A few *Populus angustifolia* were seen 8 miles below the Agency & *P. monilifera* slopes a few miles north of the Agency, only boxelders & willows going up the stream past it.

The Mission & sub-agency are in transition zone in a grassy valley, well watered & pleasantly located. Indian tepees are all around them, but we saw very few inhabited Indian houses until close to the Agency, below the houses are all closed & the Indians away, probably to escape the Mosquitos. Caught only a Sitomys in morning & did not reach camp in time to set traps before dark. A hot day but a shower in evening cooled it off.

July 11 Continued up through Pryor Gap to the summit and turned up the first little creek coming from the east. We suppose it to be Sage Creek, followed up it about a mile, as far as we could with wagon & camped at edge of thick patches of spruce & pines in a wide cañon. Set traps along stream & in pines. According to U.S. Geol. Map the Mission is about 3600 ft. and by the aneroid our camp is 4600, & the divide in Pryor Gap is 4400.

July 12

F2

Pryor Mts.

Caught only an *Arvicola longicauda*. Went up canyon & out on tops of range & hunted all of the afternoon. Killed a *Sciurus* & a *Lynx*. Saw lots of fresh bear signs, some deer & elk tracks. A fine country to hunt in, popple thickets & spruce & pine groves & open sage brush & grassy ridges. The main range of the Pryors are still farther to the east. Rained in PM. Got wet.

July 13 Caught nothing. Broke camp & followed down the canyon to road & over onto Sage Creek about 4 miles. Turned up Sage Creek & followed it from 11 AM to 6 PM. far beyond any road. Camped at north base of the highest peaks which have a good timberline & lots of snow. Our camp is still low, Averoid reads 5600, but dense groves of spruce & pine are close by & we can climb the steep slopes above. The country is mixed, forest & park, with gradual slopes of smooth, grassy swells. Had to take off half our load & pack it on the saddle horses for the last 2 miles. Probably came 12 miles up Sage Creek & are not far from its head.

July 14 Had out only a few traps but got a *Meosou* & an *Arvicola* & 2 *Thomomys*. Started up the Mts. at 9 a.m. & reached the top at 11 on what seems to be the highest peak of the Pryor Range. Averoid at camp reads 5600 feet & on peak 8360, but I think it reads low. There is a good timberline along the N.E. slope 300 feet below the summit & great banks of snow above it.

Picea engelmanni & *Pinus flexilis* form timberline.
P. murrayana stops here down. *Pseudotsuga douglasii* reaches the edge of timberline as a dwarfed shrub.
I never saw it at timberline before though the altitude is not too great for it. The other timberline trees are as dwarfed & depressed as usual but if the altitude registered by the aeronial is correct the timberline & snow line are abnormal.

The north face of the mountains is abrupt & they slope off gradually to the south in great grassy slopes. A few small groves of spruce stand on tops. From the summit we could look all over the Bighorn Basin & see the Cañon of the Bighorn, Could see the Bighorn Mts. & Owl Creek as a continuous ridge joining the high Mts. to the west of the Basin.

Apparently a wide gap of low country lies between the Pryor Mts. & the Beartooth & connects the Basin with the Clark's Fork Valley. Much of the basin in sight is badlands, but green stripes show where the stream valleys are fertile.

A giant mass of mountains rises west of the Bighorn Basin. Thousands of feet of snow stretches above timberline in dense masses. The high mountains of the Park are in plain view & run off to the south into the Wind Rivers and snowy peaks reach far to the north.

I never saw a greater mass of mountains.

Saw 4 antelopes on top of the mountain but no signs of elk, sheep or deer. Horses & cattle range over the top. Saw 2 *Arctomys* but failed to get one. *Otocoris* is common & in pairs over the summit.

Prayer Mts

On my way down killed a big blacktail buck & saw another. Came to camp & got packhorse & went after the deer. got him on the saddle & the horse rolled down a steep slope end over end till he struck a tree & nearly smashed himself. Did not get back in time to set traps.

A beautiful day.

July 15 Caught 3 *Arvicolas* & killed 2 *Sciurus*. Finished the deer skin, made up a small skins & set a good line of traps.

Rained a shower in P.M.

July 16 Caught one *Sorex* & Dutcher caught 2. Made up a lot of skins.

July 17 Caught 2 more *Sorex* & other things. Took up traps & started down the Creek. Put half the load on the saddle horses, both team horses are lame, one from rolling down hill with deer on his back, the other burned his foot with a rope. It is not difficult to get down the creek with a light load.

Shot a big *Artemys* on the way down & saw where an Elk had followed the road 2 miles since morning.

Camped at the first ranch on Sage Creek at edge of Indian reservation & about 3 miles from south end of Prayers Gap.

Around camp *Artemisia arbuscula* is the common sage. Shot 3 young sage grouse from a large flock consisting of 2 sized young.

Sage Creek

July 18 Left Dutcher & Wier at camp while I took the saddle horses & buckboard & blankets, traps & gun & started down Sage Creek into the Bighorn Basin. Followed down the creek 20 miles to a ranch where I arrived at 3 P.M. & on learning that it was still 16 miles to the Stinking Waters concluded not to try to make it, but turned back about 8 miles to a good place to set traps & camped. Camped at 5 P.M. & set out ~~3~~ traps & shot ~~2~~ cottontails.

Shot 5 *Tamias minimus* & a *Cynomys leucurus*. Caught leucurus first about 8 miles from our base camp at edge of reservation. Saw a small colony of *C. ludovicianus* about 2 miles before striking the first *C. leucurus*.

After striking a level at about 4000 feet the character of vegetation changes entirely to desert Sonoran. Grass is scarce, *Cactus* & *Sarcobatus* & *Atriplex nuttallii* & *confertifolia*, *Artemisia spinescens* & *pedatifida* are characteristic, though *A. Tridentata* & *cava* are also abundant. Much bare, dry soil, scattered vegetation & badlands give a desert aspect.

The country strongly resembles that of Owl Creek & Kirby Creek.

Sage Creek is a stream that I can jump across & carries no timber but a line of Willows & Bullberry bushes. There are 3 branches up near the Reservation line & no

wore till the one I struck & turned back at & I think so now below till it reaches the Stinkingwater, any way not for 9 miles below. The Pryor Mts. slope up from the Basin like the edge of a saucer. Part of their base is rocky & covered with a thicket of juniper or *Circocarpus* bushes.

July 19 Caught only one *Perognathus*, shot a few more rabbits. Got up early & took up traps & started back. Reached camp at 11 & made up skins the rest of day.

July 20 Broke camp at 9 and struck across for Red Lodge by Clarks Fork. Aneroid at camp read 4250, about 200 feet below top of Pryors Gap. On rim of Basin 4500, At Clarks Fork 3375, At camp 3900

Crossed smooth mesa & up a gradual slope to rim of Basin, then down steep gulches through broken hills & badlands about 10 miles to the river. Clarks Fork has a good scrubbrush valley irrigable for about 2 miles wide.

Big ditches have been taken out & banks all starting up. A few trees & some brush remain along the river part way. Reached the river at 1 P.M. & found it too high to ford. The water went over the horses backs. Took load across in skiff & road horses across & floated wagon with long ropes. Wagon rolled over twice & we lost the things out of seat box. Got over about 4.

Followed up river about 3 miles & camped. Set traps for *Perithrodontus*. Mosquitoes very bad. Came about 15 miles

Clarkes Fork & Red Lodge

July 21 Started for Red Lodge but got only about 5 miles. Found Perodipus holes - , camped & set traps & finished our reports.

July 22, Caught only Perodipus & Perognathus Sunday.

July 23, Caught a Perognathus, 2 *Setomys* *savienensis* & a *S. midiguanensis*, or some other small form.

Started at 7 & reached Red Lodge at 2 P.M. About 15 miles all up grade. One hill took us up 1000 feet. Average of camp by Clarkes Fork was 3425, at Red Lodge 5200.

Camped a mile above town by Rocky Fork at 5275. Left the distinctly Sonoran valley at 3800 feet, are now at edge of Boreal Zone. Rocky Creek is the swiftest stream without falls I ever saw.

The water is bright green, clear as crystal. Good farms below town.

Red Lodge is a coal mining town of 1000 people, or more.

July 24, Spent the day in packing & shipping specimens & getting repairs on outfit & finding out about the country & writing. All ready to pack up the cañon in morning.

Beartooth Mts.

July 25 Drove up the canon to the last ranch about 5 miles above town and left our wagon & half the load. Put the rest on our two team horses & started up the trail. Left Rocky Creek at 6200 and climbed up a rather steep grade to 9000 and then over great smooth slopes on a plateau divide. Timber stops at the edges and leaves the table land open & grassy, apparently above timberline but not in elevations. In places there are spots of true timber along north slopes and big banks of snow lie in the gullies & on sheltered slopes. It is fun traveling along the top & the cool fresh air comes over the snow fields while it looks hot & brassy down in the valleys. After 3 or 4 miles along the top we camped at 9000 between great snow banks in a little point of spruce. *Picea engelmanni* & *Abies* & *Pinus albicaulis* are the highest trees near our camp. *Pinus flexilis* and *P. Murrayana* came up the slope from 6200 to 8000 & then *Pinus albicaulis* & *Abies* took this place. *Douglas spruce* stopped lower down. The little *Vaccinium microphyllum* is abundant on the slope & full of red berries which are good. On the summit grass is luxuriant & alpine plants abundant. Camped at 5 P.M. & set traps for *Peromyscus* & *Sciurus*.

Beartooth Mts.

Shot an old & young woodchucks & a
Sciurus & saw Lagomys.
The mosquitos were very troublesome till it
grew dark & cold. It is almost cold
enough to freeze within a rods sus
is a bank of snow 20 rods long by 6
wide and many feet deep.

The main range lies to the west & great
peaks rise high above timberline with
immense snow fields.

July 26 Caught 2 Sorex & a Neosorex & an Eotomys
& Sitomys. Dutcher caught Arvicola & Sitomys.
Packed up and continued to follow the divide
between branches of Rocky Fork & Clark Fork.
Traveled slowly from 9 till 5 and camped
at what we suppose to be Beartooth Lake.
Were above timberline all the way till we reached
the lake, and part of the time out of sight of
timber. The snow banks were too soft to cross
so we had to pick our way around them &
often found the ground very below them.
The arvicel remained close to 9000 all
day though we ranged more than 1000 feet
up & down. Probably our last night's camp
at timberline was 10000 & we have been
more than 1000 feet higher today.

Found good traveling most of the way
but no trail. Passed dozens of little
lakes, one was partly covered with ice &
small snow-glaciers were breaking off in
others. Most of them were deep & very
clear & some were green.

Beartooth Mts.

There are no trout in the lakes & streams up here, the descent is too steep.

Saw lots of *Arctomys* & one *S. lateralis* & one *Tamias* & lots of signs of *Lagomys* & *Accipiter*. Saw at least 100 *Amthus*, the commonest bird high up. Grass & alpine plants are abundant except where snow has just gone off & left the ground bare. The plants are almost all the same as those of the Wind River Mts. A very pretty yellow *Caltha* is new to me. *Ledum glandulosum* is in full flower, which surprised me. *Genn* & *Bryanthus* are in full bloom.

In the morning the plants were white with frost & the snow had frozen & our little creek had gone dry. Drowed about half the day. It was so cold we nearly froze with all the clothes on we could get hold of. The wind drove the round snow into our faces & we could hardly keep the horses going against it.

Probably came about 15 miles but made some long crooks that were unnecessary. Bear Tooth Lake is about 300 feet below timberline.

July 27, Left part of our ammunition & some other things down at the ranch, so I started down for them. Went back over the same trail on which we came up. Started from camp at 8:20 & reached Red Lodge at 7 P.M. Killed a *Tamias* & a *Desmodopus*. Cold & a little snow flew in morning.

Beartooth Mts.

July 28 Started up with Dr. Foster and reached camp at 6 P.M. A warm day & the horseflies & mosquitos are very bad. especially the mosquitos at camp at the lakes. Shot 2 Tarnias & a young Arcticouff. Rode across the big snow banks and so saved considerable distance.

July 29 Caught a lot of mammals & made them up & set more traps. Took a tramp down the creek to the fork & up the east branch and around over the ridge between. Killed only a duck. Rained by spells.

July 30 Caught 2 warters & a lot of other things, set a line of traps above timberline & worked on skins.

Dr. Foster killed a spotted blacktail fawn.

Rained several showers. Mosquitos are very troublesome.

July 31 Took up my traps above timberline & worked all day on skins.

Aug. 1 Worked till 5 P.M. on skins. Took up all but my warter traps.

No frost in morning & no rain all day, the only day of no frost or no rain since we came into the Mts.

Up Clarks Fork

Aug. 3. Broke camp and started for Coote City at 7 AM. Struck west over ridges & valleys to edge of plateau & then down into Clarks Fork Valley at the junction of Crandle Creek, then up the Clarks Fork road about 1/4 miles and camped 12 miles from Coote. Averoid at camp 8900, at mouth of Crandle 6200, at camp 6850. On top of the Mts. we passed lots of little lakes & crossed numerous marshes & springy places & snow banks. At 8000 we struck *Populus tremuloides* & *Balsamorhiza* & other plants & also *Spermophilus elegans*. Saw *Tamias* climb trees & one down in the sage but did not kill them. Killed 4 *Dendragapus* & 4 *Bonasa*. Saw two *Lepus bairdi* & passed through miles of thick woods where they are numerous. Struck *Lonicera involucrata* & *Linnæa borealis*, the latter for the first time in my life. A few mosquitoes & flies bother us in the valley but not so many as on the mts.

Came about 25 miles.

Clarks Fork Valley is a great glacial trough with scoured & rounded points & sides and along the middle are half a dozen or more granite knobs rising 100 or 200 feet that have stood in the path of the glaciæ until worn round & smooth. They are hemispherical & almost bare rock.

Cooke City

Aug. 3. Followed up Clark's Fork & over a divide & down to Cooke City a mile beyond. Then down Soda Butte Creek to Soda Butte station near the East Fork of the Yellowstone & camped.

Aeroid read at morning camp 6850 on divide 7700, at Cooke City 7500, at camp 6650.

Ran 34 miles.

Clark's Fork Valley continues to the divide as a glacial valley full of forest & parks & streams. The forest is largely *Pinus murrayana* with *Picea engelmanni* & *Abies* & some *Pinus flexilis*. Popple is common.

Cooke City is an old, dead mining camp in a canon 5 miles from the Park line. At the hotel were a black & brown bear & a *Lynx canadensis* chained.

Down Soda Creek is beautiful forest & parks & streams through a spiny cañon with high, bare rock walls. It is a wide, bottomed, glacial cañon well clothed with soil & vegetation & timber. The timber has a fresh untouched look that is delightful, but we saw no signs of game & no animals save Red Squirrels & chipmunks & a few Blue Grouse. Soda Butte is a crater like snowy cone

Yellowstone Park.

Aug. 4 Came down Soda Butte Creek to the East Fork of Yellowstone & down it to the main river. Crossed on a bridge and followed a trail up the west side to Tower Falls and camped a mile beyond on a little creek. Set traps for small things.

Tower Falls are close to the river on a side creek, a very pretty fall about 75 feet high. The river flows through a low cañon & is narrow & rapid. Basaltic cliffs border it in places. Some high ridges are porphyry or some kind of old lava rock. Only low mountains are in sight.

Altitude at morning camp of Soda Butte road 6600, at bridge of Yellowstone 6000, top of Tower Falls 6250, Camp 6450. The lower valleys are strongly transition but no sign of Tertiary forms.

Saw one *Cervus* doe, 3 wild geese, *Spermophilus elegans* reaches down to the river - A *Zapus* that climbs trees is rather curious.

We saw a lot of fresh beaver cuttings along Soda Butte Creek. Some elk horns & deer tracks seen.

Pseudotsuga douglasii & *pinus murrayana* & *P. flexilis* are the commonest trees. Some *Picea engelmanni* along streams. *Populus tremuloides* is abundant in thickets & *Populus balsamifera* and probably also *P. angustifolia* grows along the streams.

Passed some sulphur springs near the river above the bridge & some more at the Tower Falls.

Came about 22 miles.

Yellowstone Canon

Aug. 5. Followed an old trail up the river & struck the lower end of the canon, followed an old trail along the edge & through fallen timber & then up along side of a mountain & lost some time in the woods. Finally struck the main trail & came to some large boiling sulphur springs with jets of steam puffing out & great, striking pools of water boiling & rolling. Passed a lot more warm & hot springs & then again struck the canon and followed the edge up to the hotel near the falls & camped at 8 P.M.
Too late to set traps.

The views of the canon are grand & wonderful. The sides are steep or perpendicular & in the deepest places the top is often not over half a mile wide.

The sides are & most of the way brightly colored yellow, red, or green & various dark shades. Little pinnacles stick up all along the sides. The river is an emerald green ribbon at the bottom, rapid & foamy. On the east side some 3 miles below the hotel is a little stream falling over the edge of the canon down in several white strings to near the bottom.

After passing the group of mts. to our right we came onto the great plateau which is almost solidly covered with forest. For miles the timber is solid & looks like black velvet. Some large parks show farther up. We came through numerous little meadows & parks.

Aneroid read 8000 at highest edge of canon & 7700 at camp near hotel.

Yellowstone Canyon

Caught an *Citellus longicauda* & *A. pallida* & a *Sorex* & Dutcher got an *Erethizon*. Saw an *Antilocapra*, lots of deer tracks & some elk tracks & 2 bear tracks. Lots of *Sciurus* & some *Tamias* that climb trees. Heard *Arctomys* & saw *Erethizon elegans*, & one *Lepus* *richardsoni*.

Pseudotsuga & *Pinus murryana* are the most abundant trees. At 8000' on E. slope we found *Abies* and *Pinus contorta* is the commonest spruce on the plateau. Some *P. flexilis* is scattered all along. *Populus tremuloides* forms some thickets, & along the streams are *Alnus* & *Salix*. *Lupines* & *Linnum perenne* & *Phlox douglasii* and *Solidago* are in bloom. *Balsamorhiza sagittata* is common below but does not reach up onto plateau. The top of the plateau appears to be purely Boreal.

Ave. 16

Went down to the falls of the Yellowstone then across to Norris Basin & then to the Middle Basin & camped.

The timber is almost continuous & almost pure *Pinus murryana*. The fallen trees of old burnings cover most of the ground through the forest. The growing trees are mostly small & stand thickly.

Saw *Erethizon latrolis* in several places & lots of *Tamias* & *Sciurus* & hills of *Thomomys*.

Middle + Upper Geyser Basins

Aug. 7. Dutcher, Dr. Foster + I took our saddle horses + leaving the rest at camp rode a trip to Upper Basin + back. Saw the Castle, Bee Hive, + Old Faithful spout + had a look at most of the other geysers. Saw a little lizard just above Excelsior, a little Sceloporus with 2 lateral stripes.

Aug. 8. Packed up + returned to Norris Basin + on north to 8 miles of Mammoth Hot Springs + camped by Obsidian Creek. Passed the Beaver Lakes + Obsidian Cliff. There is a big beaver house in one of the lakes and an old abandoned one in the lower lake. The best one is apparently occupied is built of sticks + rubbish in the lake, is about 10 feet wide + 4 or 5 feet high.

The Obsidian Cliffs are a section of a lava stream and in one place are almost pure obsidian of a mixed quality. It is in basaltic columns 50 to 100 feet high + from a foot to 4 or 5 feet through. Great chunks broken out are pure, black glass, but not transparent. To the north of us is a good sharp crater and a low flat one.

Killed a *Zenaidura lateralis* with a stone + saw + tried to kill a lot of *S. lateralis*. Saw muskrat houses.

Camped + set traps by the edge of Willow Park.

A hard frost in morning, warm day. Midgets bad. a few horse flies, at in evening a few mosquitoes.

Mammoth Hot Springs

Aug. 9. Went down through the Golden Gate to Mammoth Hot Springs & across Gardiner River & up one fork over a divide & down to the Yellowstone at Yancey's Hotel & on 2 miles farther to the bridge & camped. Came 30 miles.

Came out of the thick timber into a park region up at Willow Creek & Indian Creek & struck *Spermophilus elegans* at about 7400 feet. Top of cañon leading down through Golden Gate is marked 7300 feet. Down the cañon we drop rapidly to the Hot Spgs. & some 200 or 300 feet lower to the river.

In the deep river valley there is little timber & it is mainly Transition Zone. Douglas spruce & junipers are the principal trees. It is a hot cañon & on the hottest slope are several species of Sonoran Plants. Grassy ridges & parks characterize the country between the Gardiner & Yellowstone Rivers, a good antelope country. We saw two droves - 11 & 15.

At the Yellowstone River we strike another Transition Valley with a possible element of Sonoran on hot bare slopes but is true Sonoran Zone.

The rock is mainly lava & basalt & porphyry.

Saw a Badger & Porcupine, Tamias & *Spermophilus elegans*. Caught a *Sorex* in morning.

Aug. 10. Started at 8 & reached Cooke at 7. Came across to East fork & up Soda Butte Creek on the route by which we went down. Rained about half the P.M. Camped in old cabin at Cooke.

Clarks Fork + Beartooth Mts

Aug. 11. Got a late start. 2 horses had to be shod. Crossed the divide & down Clarks Fork to crossing above mouth of Crandall Creek & camped on east side of river. Killed a lot of Tamias & Spermophiles.

Aug. 12. Started at 8 & reached our old camp at Beartooth Lake at 2 P.M. Found the trail very good as we knew the way & could cut off some distance & found better roads. Camp came probably 15 miles & from 6400 feet to above timberline.

On leaving our camp at the lake 10 days ago, Dutcher left out 12 wading traps. Tonight he went to them & found a Marten, a Lynx & a Gulo.

Mosquitos & flies still bad.

Aug. 13. Left camp at about 8 & camped 14 miles above Red Lodge at 7 P.M. Got the mail.

Aug. 14. Worked all day on specimens & got nine all in good shape. Dutcher has still some skins to stuff.

Aug. 15. Worked on reports & packing specimens. Set a few traps in evening. Saw some bats but did not get one.

Red Lodge

Aug. 16.

Left Red Lodge and crossed over to Red Lodge Creek and down it to about 15 miles from town. Camped at Aleotts ranch. Wrote till late.

Since we went up the mts. the grass in the valleys has become brown & dry.

Aug. 17 Crossed over to the Rosebud Cr. and down past the old Crow Agency to Stillwater River & down it to the Gibbons & crossed it to Stillwater.

Good Sonoran Zone runs up the valley of Stillwater River about 13 miles from the mouth. Pines ^{scrub pine} & junipers cover the rocky valley sides. Thick timber & brush grow along the river & its dark green foliage makes a strong contrast to the yellow, grassy valley & mesas.

Set traps for *Riethrodontomys* along river. Camped at edge of town. Paid 1 dollar toll on the bridge.

Aug. 18 Followed up the river to Morill & turned up Berry Creek and across to White Beaver Cr. & up it to main source & over a divide, or rim & down into Lake Basin & camped at first water. Up White Beaver Creek we are in a great grassy sloping prairie with pine covered hills on both sides, lots of currants & chokecherries along creek.

Lake Basin

Aug. 19 Caught 2 *Arvicola* - Dutcher caught a *Perognathus*. Went down across Lake Basin in a N.E. direction & across a low ridge & through Hailstone Basin & across the rim & over to Painted Robe Creek & camped.

Came about 30 miles. The bottom of Lake & Hailstone Basins is mainly Socran.

There are some large ponds of alkaline water & one small, stagnant stream in the Basins.

There are some good patches of grass & good feed over west of the basin.

On south rim of Lake Basin the aneroid read 4400, in bottom of basin 3700, & on north rim 4000. It seems to be a true basin with no outlet & the rim is a perpendicular escarpment of horizontal sandstone. The bottom of the valley is ridged and uneven. There are old lake shores visible. One pond that we passed is encrusted by a white crust of alkaline. The soil is partly gumbo, but mostly sand.

Socran plants fill the basin to bottom & rim but are mixed with Transition species. *Atriplex canescens* & *Sarcobatus* & *Eurotia* & *Lehmannia annua* & *Orizopeis* are all abundant. *Gautierhia euthamiae* is one of the most characteristic another is *Artimisia frigida*.

Lots of *Perognathus* tracks seen. *Thomomys* hills common. Saw about 60 available but killed none. Saw lots of Coyote and Wolf tracks & some badger. Killed 3 *Tamias minimus* along Painted Robe. *Pinus p. scopulorum* grows on the hills.

Musselshell River

Aug. 20 Came 10 miles & crossed the Musselshell at Lariva & across country beyond about 19 miles & camped by an alkaline pool. The country is barren & much of it grown over by sage. Traveled all day in Sonoran Zone. *Pithecellobium* & *P. angustifolia* form a good strip of forest along the river. The river is sluggish & not very large. The valley is alkaline and baked & barren.

Cactus is abundant, *Sarcobatus* & *Atriplex canescens* & *A. confertifolia*, & an annual *Atriplex*. *Opuntia* & *Helianthus annuus* & other Sonoran plants are common.

Saw lots of *Perognathus* holes & some good *Perodipus* holes. Lots of coyote & wolf tracks along road. Dr. Foster killed a big buck antelope from a bunch of a dozen or so.

Most of the soil is gumbo and some quite typical ridges of badlands occur. Opposite our camp tonight are some excellent specimens of badland buttes, with bare sides, colored strata & sandstone caps. Lots of fossil wood is scattered along the base & some fossil bones.

A hot day & the gleam from bare, baked soil of ashy color & radiated heat are very unpleasant & very hard on our eyes.

Had no distance of over 9 miles without water but mostly in alkaline pools & not fit to use. Passed two springs, but even in them the water is very alkaline & has a soapy feel & a sweetish taste.

To Big Snowy Mts

Aug. 2, Caught only sitkings.

Country about the same as yesterday - dry & baked & alkaline. There is plenty of grass but it is becoming very dry except in the gulches. Coal crops out in numerous places, but only poor quality of lignite.

Surface rolling or in long slopes. A few trees along some of the streams. No pine hills till we reach the foot of the Mts. Passed a ranch on Swinging Woman Creek & another at a half way point & another on Careless Creek. Followed up the west side of Careless Creek across long, smooth mesa about 8 miles & over onto head of Timber Creek & up a long, narrow valley into cañon at base of Mts. Found no water in Timber Creek but found a couple of springs up at base of Mts. & camped in thick spruce timber at head of wagon navigation. Most of the timber is Douglas spruce, a little Picea & lower down it is mostly *Pinus p. scopulorum*.
+ *Populus tremuloides*. & *P. angustifolia*.

Camped late & only set the bear traps. Found lots of deer & bear tracks.

A hot day & it seems good to get into timber again.

Aug. 2 Set out a line of traps at camp & in P.M. took our traps & each a blanket & lunch and started up the mountains to camp & set traps on top. The Mts. are too steep to get a horse up. It was a steep, hard climb of 2500 feet from camp to first peak & took us 2 1/2 hours. Then crossing a saddle we reached a big snowbank where we got our first drink of water & then went to

Big Snowy Mts.

the top of the main ridge, 100 feet higher than the first peak. Crossed over the main ridge to a small snowbank on north side where we got water in holes at edge of snow & by eating snow & camped & set traps about 100 feet below the summit. Slept in a clump of dwarf spruces.

The top of the range is mostly barren & dry. great fields of broken rock show hardly any signs of vegetation. Timber comes to top of the range along road west half. There is good grass for feed along the edge of the north slope.

The whole range seems to be a hard limestone with occasionally fossils of old forms of life. The strata are nearly horizontal at the top with only a slight dip to the north. Numerous funnel or well shaped sink holes occur on the summit, some are deep and contain snow down 20 feet or so. The broken rock is in small scales, which on level places are usually arranged on edge. There seem to be no openings in the ledge rock & the shingle is in so small pieces that no cavities occur & no cover is offered for logcamps.

Dryas octopetala is the commonest plant on the top, dry areas. It grows in strips & beds. is in blossom on north slope. The first I ever saw to know. Sheep & deer tracks around snowbanks. *Tamias* heard & seen at timberline. *Arvicola* holes are abundant.

Killed a *Desmodus* at snowbank & saw more.

So smoky we could not see to bottom of Mts.

Big Snowy Mts.

Aug. 23. Slept cold, got up early.

Caught 2 species of *Arvicola*.

Started down the mountain & reached camp about 10 A.M. Killed a *Tamias* in cañon. Saw lots of deer & bear trails.

Reached camp tired out & worked the rest of day skinning 19 mammals. Found 5 *Zapus*, a lot of *Erethizon* in lower traps & 1 *Sorex*. Moved camp half a mile down into lower park, when Dr. Foster found a good spring. Hot & very smoky.

Aug. 24 Caught a lot of small mammals & worked all day making skins & setting more traps. Dr. Foster left us for Great Falls & I drove to Colorado.

Another hot day but not so smoky.

Aug. 25 Caught 2 *Lepus bairdi* & a lot of small stuff.

Aug. 26, Sunday, caught only small things, rested.

Aug. 27 Took up traps & started for Umt & Great Falls. Went down the valley about 3 miles & crossed the creek and over into very rolling west where we found a ranch and a lot of *Peromyscus richardsoni*, the first of the season.

Continued across creeks & mesas along foot of Big Snowy Mts. to west end of sage & across the Gap to Umt. - a store & saloon & hotel & stable.

There is a break of about 10 miles between the timber of the Big Snowy Mts. & Bitter Mts. Between is dry prairie & grassy valleys, and small creeks. Sandstone crops out in places. It is the rock of the valleys. The Mts. are limestone.

Ubet - Philbrook

Leaving Ubet we travel N.W. over dry mesas and short grass prairie with very little water for 10 miles to camp. Lots of *Spermophilus* all along but no *Cynomys* seen. Camped early & made up skins & set a few traps. Came about 25 miles.

Aug. 28. Traveled all day over grassy plains, or smooth mesas and creek valleys between. Most of the creeks were dry. Judith River is the only stream of any size & it could be jumped across. It furnishes water to a lot of large ranches in an excellent farming valley. Thickets of willows & a few trees grow along it. Otherwise no trees seen all day. It is so smoky we can not see over 5 miles.

Saw no mountains and few hills. Wheat, oats, & hay appears to be the principal crops on the ranches. Passed 3 large herds of sheep & saw a good many cattle & horses on the range.

Traveled all day in Transition Zone, though down to 4000 feet at Philbrook. There were no signs of Sonoran species. No cactus or only 2 or 3 plants of *Filanthus annuus*. *Artemisia frigida*, *Gautierezia euthamiae*, - *Cleistis scandens* are the characteristic plants besides grass. Gramineous grasses are the prevailing species on upland.

S. richardsoni, com. all along. Caught an *Arvicola austrius* in road & Dutcher found an *A. pallida* dead in road. Saw signs of *Lepus campestris* & badgers & coyote tracks. No *Cynomys*.

Came about 25 miles. Philbrook has a good little store & a shanty hotel.

Stanford to Grafton + Belt.

Aug. 29. Shot a skunk at camp in the night
& caught 3 Arrioles.

Got a late start. Traveled all day over prairie.
Saw a few willows on creek at Stanford. No trees.
So smoky we could not see a mile.

Grass start but good feed most of the way.
Lots of sheep & cattle & horses.

Saw one Coyote & one Badger & lots of sparrowhills.
Lots of longspurs and starlings & Pooecetes.

A little rain in the night made the gumbo
slightly gummy in morning. Cloudy all day & cool.

Camped at Grafton, a stage station

Aug. 30. Started in a drizzling rain but it did
not last long & did not make the gumbo very bad.
Cleared off by noon but still smoky.

Same kind of country continued - prairie and
long ridges and valleys. Passed Geyser
and Cara - stage stations & P.O.

Passed through Arnington and Belt and
camped 2 miles below Belt on creek.

Saw a few *Pseudotsuga* along rocky creek banks
near Arnington & along Otter Creek is a
good row of trees of *Populus balsamifera* &
P. angustifolia & willow. High sandstone ridges
border the narrow valley and coal crops out
under the sandstone & is mined to some
extent. At Arnington a Sonoran element
appears, though weak. *Sophora argentea*, *Helianthus*
annuus, & *Opuntia* appear for the first time below
the Musselshell valley. also *Glycyrrhiza*.

Saw one *Tamias* in valley of Belt.

Belt to Great Falls

East of Cora is a very interesting dike running for 4 miles, or as far as we could see, along the crest of Rocky Ridge. It is a crystalline rock, apparently of volcanic origin, is in an upright position, a strip about 8 feet thick & unknown depth, breaks in irregular horizontal planes.

Aug. 31. Climbed out of the Otter Creek valley and struck N.W. across rolling prairie to Great Falls. Could see the smelter chimneys as soon as we reached the top of prairie 3 miles from Belt. Struck no water till we reached Great Falls city. This is a very good town, appears prosperous and booming & I should judge contains 15000 inhabitants. Got our mail, crossed river and camped a mile down stream on north bank. Set a few traps.

Sept. 1.

Packed specimens & wrote report & letters & returned to town & sent them & got supplies and in P.M. started down river on N. side to Great Falls. Reached the falls after dark & camped above on edge of prairie. It is too late to set traps.

Sept. 2 Sunday, The Great Falls are 78 feet of sheer drop. About half way across the river the falls are broken & form a series of five cascades. The water is now low & the falls are not very great, compared with some others. The rock is all sandstone. The cañon below the falls is scarcely 200 feet deep.

Great Falls

Sep. 3. Wrote reports, packed specimens & set traps.

Wind howled all day, cold.

Sep. 4 Caught a *Wezchitis* & 8 *Citomys*, Dutcher caught a *Neotoma* & 3 *Citomys*.

Broke camp & returned to Great Falls town and thence up Sun River's valley about 13 miles to near Sun River and camped.

Cyprays are very numerous. Shot a Badger. Saw *Spermophilus* holes only near Great Falls town. Made up skins in evening.

Came about 25 miles

Sep. 5. Followed up Sun River's Valley to Sun River (town) and then left the valley and turning northward traveled over smooth, grassy plains to a great dry basin called Freezecut, where are several ranches and much stock, sheep & cattle & horses. A few miles beyond we struck a large ditch of excellent water coming from the N.W. and a lake near it. Camped by the ditch with good grass & water. Not a tree seen after leaving Sun River. Sun River Valley is settled and is full of fine ranches, with large fields of hay & grain, good buildings, trees set out and prosperous looking farms. The river is quite large & the water excellent.

No water along road for 15 miles between Sun River, Crossing and Freezecut, but good grass all the way. Lots of Cyprays & *Spermophilus* along road.

The high, snow capped range of the Rockies appears not far to the west.

Choteau to Robare

Sep. 6 Rained incessantly all night and all day. Staid in camp and did very little work. Killed 9 ducks of 6 species. Cleaned guns and did odd jobs. Set a few traps.

Sep. 7 Cleared up in night. Ground wet and roads muddy. Caught only an *Avicola* killed some more ducks. Got a late start went through Choteau and camped just north of Bynum. Came only 17 miles. Roads soft. All prairie except the stream valley.

Choteau is in the valley of Gravel bottom Creek, which is a good farming valley. There is abundance of water for irrigating & the land lies in broad gentle slopes. The country is purely transition.

About Choteau are *Populus angustifolia*, *Salix c. vestata*, *Alnus*, *Betula occidentalis*, *Elaeagnus argentea*, *Potentilla fruticosa* in the creek valley. Not a Sonoran plant appears. A branch of *Shepherdia argentea* appeared in the road but never seen growing. Fine grass covers the prairies.

The Teton Mts. seem about 20 miles distant and are a rugged, broken, & rocky range with a low timberline & some old snow.

Sep. 8 Started early & drove 26 miles to Robare on Birch Creek and camped in time to set out a line of traps. Traveled over somewhat broken prairie with numerous alkaline runs and dry gulches, good grass. Timber seen only on Drygass and Birch creeks & on them only *Populus angustifolia* and a few trees of *P. balsamifera*.

Dupuyer to Blackfoot.

Saw 10 *Archibitos* & killed one of them.

They are hunting *Spermophiles*.

Shot a Badger but did not get it.

Dupuyer has a store, a saloon, a blacksmith shop & a church, is the best town in the county.

Robare is only a saloon & ranch.

Sep. 9 Caught an *Oryzomys* & some *Sitomys*.

A Fox stole some of my traps so we stay over a day & try to catch *Vulpes velox*.

Shot a *Tamias laterorientis*, & *Lepus campestris*
Set traps.

Went to traps by moonlight in evening and found a *Vulpes velox* in one of them.

Sep. 10 Caught 2 *Lepus artemis* & some *Sitomys*. Dutcher caught a *Tamias laterorientis* & some *Sitomys*.

Reached the Blackfoot Agency at noon & Blackfoot at about 6 P.M. Came 27 miles. Saw the Agents clerk - Mr. Garrett, & got a letter from him. Met the Agent - Capt. Cooke, on the road. Passed the Catholic Mission on Two Medicine Creek.

Camped near town on Willow Creek.

Sep. 11, Made up skins and wrote some reports. did not wear camp.

Set traps for *Arvicolas* & *Thomomys*.

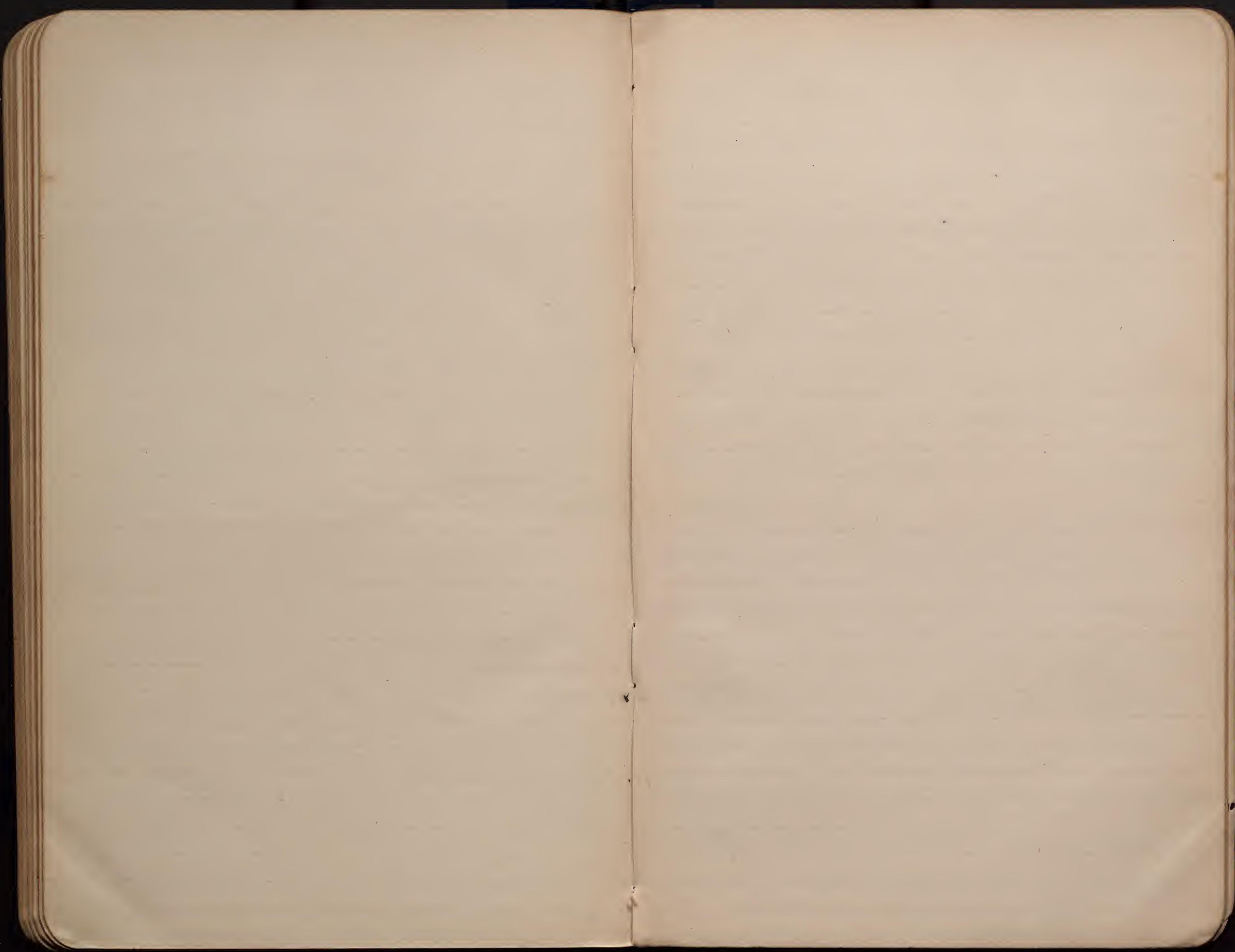
Sep. 12 Intended starting early for the Mts. but a cold rain continued all night & all day with some snow on prairie & much snow in mountains.

Blackfoot, Mont.

Sep. 13. Made arrangements for storing outfit & busses with Mr. Ripp. Packed specimens & wrote some.

Made up skins of Sparrows & Oriolus etc.

Sep. 14 Stored outfit & turned out the busses. Took train east at 2 P.M.



May 26	traveled	24 miles	July	5th	miles
" 27	"	18			12
" 28	"	23		6	3
" 29	"	29		7	8
" 30	"	37		8	12
" 31	"	2		9	25
June 1	171		21	10	25
2	"	25		11	6
3	"	10		13	16
4	"	30		17	12
5	"	30		18	28
6	"	15		19	12
10	"	5		20	15
11	"	5		21	5
12	"	15		23	15
13	"	8		25	13
15	"	20		26	13
16	"	20		27	25
17	"	8		28	25
18	"	20			26.9
19	"	15			4.5
20	"	10		21	25
21	"	5		3	32
22	"	25		4	24
23	"	15		5	15
24	"	22		6	29
26	"	18		7	24
28	"	20		8	27
29	"	4		9	30
30	"	5		10	35
July 1	373		25	11	20
2	"	20		12	15
3	"				5.75

Aug.	Miles traveled	1	2	3
13,	25.			171
14,	15			373
17	30			269
18	30			577
19	30			134
20	29			1505 miles traveled with
27	25			Terrell in 1941.
28	25			
29	20			
30	30			
31	22			
	55.7			
Sep. 1	121			
4	25			
5	23			
7	17			
8	26			
10	27			
	130			
	110			
	107			
	82			
	74			
	72			
	65			
	62			
	55			
	52			
	45			
	42			
	35			
	32			
	25			
	22			
	15			
	12			
	10			
	8			
	5			
	4			
	3			
	2			
	1			

1860
4424
374

For Spurs

<u>Wheat</u>	<u>Seeds</u>
1	1
6	3
8	1
1	1
3	

